CRJ-700 Alerting Issues – Lateral track or vertical path deviation beyond limits

1. Initiating Condition: Autopilot failure Initiating Condition: In RNP approach and similar Next-Gen terminal area operations, the aircraft's failure to follow the centerline of the lateral track and/or vertical path within the required deviation limits (e.g., RNP value for lateral track), due to excess wind, autopilot failure, failure to engage autopilot/mode, or specific FMS/autopilot inability to meet specs

Type	Alert or cue	Threshold for alert or cue to be presented	Confusion regarding alert or cue	Other issues with regard to alert or cue	When alert is inhibited/suppressed or when cue is masked	How alert or cue is terminated
Visual Alerts	None					
Aural Alerts	None					
Tactile Alerts	None					
Visual Cues	On the MFD map display, the aircraft symbol deviates from the magenta line (lateral deviation)			Detecting lateral track deviation from the aircraft symbol/magenta line display is ambiguous because display of the deviation depends on the range setting on the EHSI/ND display.		
Aural Cues	None					
Tactile/ Somatic Cues	None					

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Expected Pilot Response(s)

- Recognize track/path deviation exceeds RNP lateral/vertical limits
- If not in visual contact with the runway, execute a missed approach.
- Hand fly lateral path during missed approach to within RNP limits (including RF leg) until automation can be re-engaged.

Possible sources of confusion with regard to pilot response(s)

- If in HDG mode and tracking a RNP course, any deviation from the course will not produce any visual or aural alerts. The only clue will be the pictorial display on the MFD

How does pilot know condition is resolved/recovered?

- Flight path is recovered to within limits

Issues with regard to multiple concurrent non-normal conditions

- Aircraft making a missed approach in response to this condition may complicate Next-Gen automated sequencing/metering or traffic separation.

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Footnote:

- Rockwell Collins introduces new Performance-based Navigation capabilities to its FMS-4200 on
- CRJ700/CRJ900/CRJ1000 Next-Gen Aircraft NASHVILLE, Tenn. (May 19, 2011)
- With the latest version of the Rockwell Collins FMS-4200, operators of CRJ700/CRJ900/CRJ1000 Next-Gen aircraft will be able to automatically fly Performance-based Navigation procedures, including Required
- Navigation Performance (RNP) and RF (radius to fix) legs - a first for CRJ* aircraft. This will reduce track distance, flight time and fuel consumption when compared to conventional routes.
- Additional enhancements to the FMS-4200 for CRJ700/CRJ900/CRJ1000 Next-Gen aircraft include:
- LPV approach capability
- WAAS lateral navigation guidance and messaging
- Enablement of coupled VNAV
- Full NAV to NAV transitions
- Multiple approach indication (XYZ approaches)
- Step down fixes
- Temperature compensated barometric altitudes for use with VNAV operations
- The FMS-4200 is an integral component embedded within the Pro Line 4(tm) avionics system for in-service and current production CRJ regional jets. The latest version of the FMS is available through a software upgrade for CRJ700* and CRJ900* aircraft.
- Other FMS-4200 enhancements include: WAAS lateral navigation guidance and messaging; Full NAV to NAV transitions; LPV approach capability; step down fixes; enablement of coupled VNAV; VNAV operations temperature compensated barometric altitudes; and multiple approach indication. Rockwell Collins' FMS-4200 is part of the company's Pro Line 4 avionics system. Operators can get the new FMS version by upgrading their software.